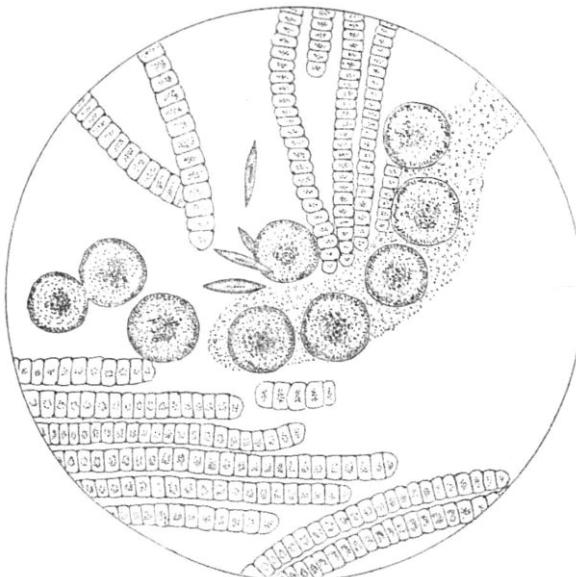


the sea-water to a depth of several feet. Samples for examination were obtained by "dipping" with a bucket, as well as by the tow-net. It seemed to be a Confervoid Alga.

On slightly agitating the water in a glass jar, the fluffy masses broke up into minute particles, which, under a magnifying power of sixty diameters, were found to be composed of spindle-shaped bundles of filaments. Under a power of 500 diameters these filaments were seen to be straight or slightly-curved rods, articulated but not branching, and divided by transverse septa into cylindrical cells, which contained irregularly-shaped masses of granular matter. These rods, which seemed to represent the adult plant, measured $\frac{1}{200}$ inch in width. On carefully examining many samples, some filaments were detected, portions of which seemed to have undergone a sort of varicose enlargement, being more than twice as wide as the normal filaments. These propagating filaments (if I am right in so calling them) were invested by a delicate tubular membrane, and contained some granular semi-transparent matter, in which was imbedded a row of discoid bodies; the latter appearing as if about to be discharged from the ruptured extremity of the tube. These bodies measured $\frac{1}{100}$ of an inch in diameter: when seen edgewise presented a



lozenge-shaped appearance, and were devoid of cilia or striae. Conjugation was not observed.

On allowing a jarful of the sea-water to stand by for twenty-four hours it was found that the confervoid matter had all risen to the surface, forming a thick scum of a dull green colour, while the water had assumed a pale purple colour, resembling the tint exhibited in a weak solution of permanganate of potash.

From November 24 to 29, during which time the ship traversed slowly a distance of 330 miles, the sea contained these organisms. For the first three days the large patches were frequently in sight, and during the rest of the time the surrounding water presented a dusty appearance from the presence of the tiny spindle-shaped bundles. On the evening of the 26th an unusually dense patch was sighted and mistaken for a reef, being reported as such by the look-out-man aloft.

Sydney, January 24

R. W. COPPINGER

Feeding a Gull with Corn

IN Prof. Semper's recently-published work on the "Conditions of Existence as they Affect Animal Life," a review of which from the pen of Prof. Lankester appeared in your columns a fortnight ago (vol. xxiii, p. 405), allusion is made on pp. 67, 68, and elsewhere to John Hunter's celebrated experiment of feeding a gull with corn. Prof. Semper, however, seems not to have been aware of the precise nature of the result of Hunter's experiment. He says: "The English anatomist Hunter purposely fed a sea-gull for a whole year on grain, and he thus succeeded in so completely hardening the inner coat of the bird's stomach,

which is naturally soft and adapted to a fish diet, that in appearance and structure it precisely resembled the hard, horny skin of the gizzard of a pigeon."

The original account, I believe, of Hunter's experiment, was published in Sir Everard Home's "Lectures on Comparative Anatomy" (vol. i. p. 271, 1814), and an extract from that work is appended to the description of Hunter's original preparation, still preserved in the College of Surgeons, in the descriptive catalogue of that collection (vol. v., 1833, pp. 149-50, Prep. 523). What Hunter succeeded in effecting was to very much increase the thickness of the muscular walls of the gizzard, which, as may be seen by comparing his specimen (No. 523) with that of the stomach of another gull close by, have become developed to an extent about double their usual size. There is no manifest increase in the thickness of the "inner"—or so-called "epithelial"—coat of the stomach visible in the preparation, nor do Home or Owen allude to any such feature in their descriptions. Hunter's experiment, therefore, simply comes under the numerous well-ascertained instances of the increased development, consequent on increased use, of muscle, and has no real connection with the "modifying effects of food," such as that produced in canaries by feeding them on cayenne pepper, and others cited by Semper.

W. A. FORBES
Zoological Society's Gardens, N.W., March 18

Dynamics of "Radiant Matter"

As the chief object of Mr. Preston's paper under the above title in NATURE, vol. xxiii, p. 461, seems to be to support Le Sage's "shelter theory" for gravity, you will perhaps let me point out one objection to that theory in any form which has hitherto been deemed conclusive, and with which Mr. Preston does not deal. It is that under it gravity would not vary, as it is known to do, equally with mass, but would vary *not* equally.

The theory applies perhaps so long as you consider only the case of isolated atoms, but it fails entirely when applied to clusters of atoms.

Observation shows that gravity varies only with distance and with mass; but if it were caused by any form of shelter hitherto imagined, it would vary also with density and with bulk in such a way that a pound of, say water, would weigh more than a pound if raised into steam, because its atoms, in loose order as steam, would give each other less shelter from the action of the kinetic æther than when in close order as water, and in such a way also that two spheres of, say iron, each weighing one pound, would weigh less than two pounds if welded into one sphere, because some atoms in the one sphere would be better sheltered than any atoms in the two spheres.

W. M. MUIR

March 21

The Oldest Fossil Insects

MR. S. H. SCUDDER has published (Anniversary Memoirs of the Boston Society of Natural History, 1880, pp. 41, plate 1) a memoir on the Devonian Insects of New Brunswick. The fragments of the six described species were discovered by the late Prof. C. F. Hartt in 1862, and have been since 1865 described in several papers by the same author. The new paper is a very detailed and elaborate one, with entirely new and improved figures, and is followed by a number of conclusions, as the final result of his work (Report, Amer. Journ. of Sci., Feb. 1881). The conclusions would be of prominent importance for the history of the evolution of insects, if they could be accepted without reserve. Of course facts and conclusions should be able to stand the most severe test; and that is not the case with this publication. "As the simpler Devonian insects have certain special relations," he says, "with the Ephemeridae, their description is preceded by an account of the wing-structure of the modern Mayflies as a basis of comparison" (p. 4).

The simple fact that not one of the described species has any relationship to the Ephemeridae is sufficient to cause us to object to his descriptions and conclusions related to this family. This statement is not based upon difference of opinion, but simply on the evidence of facts which cannot be denied by any one conversant with the families Ephemeridae and Odonata.

Platephemera antiqua is a part of the apical half of the wing, without the tip, of a gigantic dragonfly. The suddenly narrowed second cubital space is to be found in *Isophlebia* of the Solnhofen slate. The imperfection of the fragment allows no further conclusions.

Gerephemera simplex is a diagonal fragment of the middle of

a wing of a gigantic dragonfly. The reverse has a small part of the base, not to be seen in the obverse, with a straight sector crossing the horizontal ones. The same arrangement is to be seen in *Isophlebia*. Every other character important for nearer determination is wanting in the fragment.

Lithentomum Harttii.—The fragment is very insufficient, and recalls the venation of the Sialids, and among them those of the Chauliodes type.

Homothetus fossilis.—This is a Sialid of the *Corydalis* type, with a small number of transversals. The basal vein, spoken of as homologous with the arculus of the Odonata, and as proving a synthetic type, is the part in which the wing breaks off easily in actually living species. I have not seen the type.

Xenoneura antiquorum.—Some details given for this species are not exact. It has not been observed that parts of one wing cover the other; I can only say that the wing belongs to the Neuroptera, and that the venation is nearer to the Chauliodes type than to any other. The famous "stridulation" apparatus at the base is justly retracted by the author.

Four new families are proposed for these insects by the author. One of them, the *Atoxina*, is now out of the question, as *Geophemera* belongs to the Odonata. The three others are only indicated by extremely vague characters, in fact by no characters at all. Can science accept such families? I believe not.

I omit *Dyscritus vetustus* because this fragment is undeterminable.

My conclusions are, that two of the insects belong to the Odonata, three to the Sialids. There is no Ephemeroptera among them, nor any synthetic species. The proofs for my statements will be given in a detailed paper.

H. A. HAGEN

Cambridge, Mass.

Ice-Casts of Tracks

As I was riding along the highway late this afternoon, my attention was attracted to a phenomenon no less curious than beautiful. A couple of days ago there was a fall of a few inches of very damp snow, after which the temperature fell rapidly, and this morning everything was frozen hard. A large dog had trotted along in the snow while it was yet damp, and where it lay upon the old drifts by the road-side. To-day the sun has been shining very warm, cutting away all the new snow and leaving the tracks of the dog in exquisitely perfect ice-casts, thin as writing-paper, and standing on the most delicate thread-like columns, about an inch above the surface of the old snow.

Lyons, N.Y., March 7

J. T. BROWNELL

Migration of Birds

THE following extracts from a work entitled "Bible Customs in Bible Lands," by Henry J. Van Lennep, D.D. (1875), may prove interesting to some of your readers, as containing important and reliable evidence with regard to the migration of birds, which has formed the subject of two recent letters in *NATURE*.

Speaking of the great numbers of small birds which inhabit Western Asia, as compared with Europe and North America, Dr. Van Lennep explains the circumstance by the fact that "even those of feeblest wing have an easy road from Palestine, Syria, and Mesopotamia, by the Isthmus of Suez, and over the narrow Red Sea, to their winter quarters in tropical Africa, while nature has provided them with extraordinary means of conveyance from Asia Minor southward across the Mediterranean

... The swallow, and many other birds of similar powers of flight, are able to cross over the entire breadth of the Mediterranean, especially by taking advantage of a favourable wind. But many birds are quite incapable of flying over a surface of 350 miles from headland to headland across the Mediterranean without alighting, and would require many days, and even weeks, to perform the trip through Syria and Palestine. Such are the ortolans, darnags, bec-figs, wren, titmouse, smaller thrushes and finches, with a hundred other diminutive specimens of the feathered tribes... and as the severity of the winter would be fatal to them, not only in Asia Minor but even in Syria and Palestine, He who is ever mindful of the smallest of His creatures has provided them with means of transportation to a more genial clime. Many of them, indeed, find their way downward from Palestine into Arabia and Egypt, but this would be difficult, if not impossible where lofty mountains and broad seas intervene, and to meet such cases the crane has been provided. . . . Most of these birds are migratory. In the autumn

numerous flocks may be seen coming from the north with the first cold blasts from that quarter, flying low, and uttering a peculiar cry as if of alarm, as they circle over the cultivated plains. Little birds of every species may then be seen flying up to them, while the twittering songs of those already comfortably settled upon their backs may be distinctly heard. On their return in the spring they fly high, apparently considering that their little passengers can easily find their way down to the earth.

As Dr. Van Lennep has "spent almost a lifetime in the East," I conclude he has been an eye-witness of the above facts, and therefore his testimony is conclusive.

G. A.

Bath, March 16

Sound of the Aurora

WITH reference to the question mooted in last week's *NATURE* (p. 459) by M. L. Rouse as to the sounds emitted by aurora, perhaps the accompanying extracts may be of interest.

Brighton, March 20

EDWARD PAUKHURST

"Record of a Girlhood," F. A. Kemble. Vol. I.

"Standing on that balcony [at Edinburgh] late one cold clear night, I saw for the first time the sky illuminated with the aurora borealis. It was a magnificent display of the phenomenon, and I feel certain that my attention was first attracted to it by the crackling sound which appeared to accompany the motion of the pale flames as they streamed across the sky; indeed crackling is not the word that properly describes the sound I heard, which was precisely that made by the flickering of blazing fire; and as I have often since read and heard discussions upon the question whether the motion of the aurora is or is not accompanied by an audible sound, I can only say that on this occasion it was the sound that first induced me to observe the sheets of white light that were leaping up the sky. At this time I knew nothing of such phenomena or the debates among scientific men to which they had given rise, and can therefore trust the impression made on my senses."

I BEG to assure Mr. Rouse that about fifteen years ago, early in the evening, in this very quiet locality, I listened, along with my father, to the sound of an aurora, pulsing above us, across the zenith, and appearing nearer to us, or lower, than most auroras I had seen. The sound was somewhat like the rustling or switching of silk, and we listened to it for some time with great curiosity. The aurora was not coloured, as more imposing ones have sometimes appeared, but white. It recalled to me the lines of Burns in a fragment entitled "A Vision."

"The cauld blue north was streaming forth
Her lights, wi' hissing eerie din;
Ahoft the liff they start and shift,
Like fortune's favours tint as won."

Dumfriesshire, March 20

J. SHAW

Tacitus on the Aurora

WITH reference to the passage of Tacitus, "Germ." 45, quoted in *NATURE*, vol. xxiii. p. 459, I would suggest that the reading *equorum*, proposed by some commentators, is far happier than *deorum*. "It is believed that a sound is heard, that the forms of the horses and rays from a head are seen."

R. O. S.

Heidelberg, Germany

Aberration of Instinct

As an instance of "Aberration of Instinct," or I should rather say of *instinct at fault*, may be mentioned the following:—It is well known, I believe, that rooks in attacking young mangold-wurtzel pick out the plants to obtain the wireworm at their roots. It happens that plants most infested with these insects are the most flagged in the leaf. Now a neighbour whose sowing had been a partial failure transplanted some young wurtzels into the vacant places. These of course for a few days presented a flagged appearance, and were all seized on by the rooks to the exclusion of the rest. Poor disappointed creatures, what must have been their chagrin at finding no wireworm as they evidently expected!

T. H. WALLER

Waldringfield Rectory, Woodbridge, March 16

Squirrels Crossing Water

A CORRESPONDENT in *NATURE* (vol. xxiii. p. 340) is surprised to learn of the squirrel taking to the water. It is not an un-